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Order/Class names : problems in the selection of type genera

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I. Relationship of types of highest categories to their major included taxa.

Considering first the highest taxonomic levels, what should be the relationship of the types of orders to those of classes, and the types of classes to those of the phylum or subphyla ?

It seems sensible to conclude that the single type-genus of a phylum should also be the type of one of the included subphyla and, at the same time, of one of the latter's included classes, and so on down the taxonomic ladder to and including the family-group level. But which order is to be chosen to supply the type-genus for the subphylum, and possibly the phylum, of which it is a subordinate member ? The best-known order (if so, how is this determinable for certain) ? The largest ? The most widely distributed ? The most extensively studied in experimental research ? The oldest ? The most primitive or the most specialized or intermediate ? The most fully or precisely characterized ? The most representative (but considerable subjectivity becomes involved here) ? Must it be one of the orders originally included in the subphylum (or phylum) ?

In the case of the protozoan subphylum CILIOPHORA, I believe that the type-genus also should be type of the single included class and of one of the latter's two subclasses as well as of one of the included orders. The genus *Paramecium* is my choice for this type, in spite of several minor complications (see Section IV below). Kent (1880-81) listed this familiar genus as "typical" of his order (= my subclass) Holotricha, and it has long since enjoyed the reputation of being well known, widely distributed, and often studied. Its

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name is even pre-Linnean, a rare occurrence among protozoa ; it was introduced into the post-1758 literature by O. F. Müller, in 1773. Selection of *Paramecium* as the ciliophoran type-genus necessitates rejection of Copeland's (1956) recent designation of *Vorticella*, also a genus of long-standing but containing species quite atypical of ciliates in general.

The ciliate subclass not containing *Paramecium* also should have as type-genus the type of one of its included orders, in my opinion. The genus *Euplotes*, well known although rather specialized anatomically and presumably very highly evolved, is my choice here because its species exemplify so well the most distinctive characteristics of its subclass, the Spirotricha.

II. Relationship of types of higher taxa to their subtaxa.

What should be the relationship of the type of a class to the types of its included subclasses ; of an order, to its included suborders ?

This question is answered in part in the revised *Code* (Bradley, 1957). Article 18, entitled "Types", states in its first section : "The type of a taxon is always the type of its nominate subtaxon, if there be one, and *vice versa*". But what about the many instances in which none of the subtaxa is nominate ? In such instances should one of the suborders be considered more "representative" than the others, and its type-genus designated type of the order ? But if there is no suborder clearly typical of the order, should a primitive one or a more complex one be favoured to provide a genus as type of the whole order ?

In the subphylum CILIOPHORA there are at present, in the classificational scheme followed here (see Corliss, 1957), five orders which contain suborders, but in only one case is there a nominate suborder (Order Heterotrichida, Suborder Heterotrichina). Therefore, an arbitrary decision has to be made regarding which suborder will supply the type of the order in the other instances. In all four of them the choice has to be made between the more (or most) primitive and the more (or most) highly evolved group of ciliates. As a general principle, I favor designation of an ordinal type from the more primitive of included suborders ; for example : from Suborder Rhabdophorina of Order Gymnostomatida ; Suborder Arhynchodina of Order Thigmotrichida ; Suborder Sessilina of Order Peritrichida. But in the remaining case I have been more or less forced to choose the most specialized suborder as source of the type genus, for it is in the order Hymenostomatida that one finds *Paramecium* (older and most current textbooks notwithstanding !), a member of the most highly evolved suborder Peniculina, already selected (see above) as type of the entire subphylum of ciliates. Following the principle espoused in Section I, one cannot choose any other genus to represent the hymenostome ciliates.

III. Relationship of Types of orders to their included families.

What should be the relationship of the type of an order or suborder to its included families ?

If the higher taxa concerned have, in effect, nominate families, it would seem that the types of those families should without question be declared type-genera of the appropriate taxa in the order-group. When such is not the case, however, essentially the same questions as posed above (Section I, p. 1) with regard to orders within the subphylum apply here : if the "most representative" family is to be used as source of the ordinal type, how does one determine the identity of that family within the order, etc. ? Families automatically have type-genera, since a family-group name is based upon the name of the included genus which must then be recognized as the type ; but what if such types taxonomically seem quite atypical of the order, represent poorly known genera, have names in danger of becoming buried as synonyms or homonyms, etc., etc. ?

Among the ciliated protozoa, there are only three cases of suborders which contain families having their names formed from the same stem as the suborder : the family Tetrahymenidae in the suborder Tetrahymenina, Pleuronematidae in Pleuronematina, and Licnophoridae in Licnophorina. In all other instances, save two, I have endeavoured to recognize the most appropriate families as sources of types for the higher categories, employing the type-genera of those familial groups as the ordinal or subordinal types as well. In the two exceptional cases (*Saprodinium* as type of Odontostomatida and *Entodinium* as type of Entodiniomorphida) extenuating circumstances (see Section IV below) have obliged me to turn to genera not types of the families to which they belong.

IV. Relationship of newly designated types to those previously chosen.

To what extent, if any, should the "Committee of Specialists" consider as binding past actions related to the designation, directly or by implication, of types in the phylum-, class-, and order-groups ? That is, to what extent should priority become involved if or when different types have been indicated by different workers at various times in the past ?

In some cases type-genera have been selected in the past ; in other instances the stem of certain generic names has been used in forming the name of an order or suborder. What if the genera so chosen are not types of families ? Or what if they are not genera originally included in the higher taxon at the time of its establishment ? What about ill-chosen types, names of poorly described genera, or names now existing only as synonyms or homonyms ? To what extent, if any, are ethics involved ?

To my knowledge, types for the higher groups within the subphylum CILIOPHORA seldom have been deliberately selected to date. There are a few cases. Copeland (1956) quite recently designated *Vorticella* as type of his "Phylum" CILIOPHORA (and of his strange "Order Stomatoda") and *Acineta* of his Order "Tentaculifera". As implied above (Section I, p. 2), I do not feel bound by Copeland's decision regarding the type of the entire ciliate assemblage since I consider it an inappropriate one; however, I am in agreement with his designation of *Acineta* for the order Suctorida. *Tetrahymena* has, in effect, been indicated as type of its nominate suborder Tetrahymenina, and, similarly, *Pleuronema* of Pleuronematina, and *Licnophora* of Licnophorina (Corliss, 1956, 1957). Kent (1880-81), over 75 years ago, mentioned some "typical genera" of his "Sub-Kingdom" PROTOZOA in his "tabular view of the sections, classes, [and] orders". *Paramecium*, *Acineta*, *Euplotes*, and *Vorticella* were among those listed opposite the several ciliate groups recognized at that time, but solely in the case of *Paramecium* (representing "Order" Holotricha) was only one generic name matched with a given higher taxon. Nevertheless, I have allowed myself to be influenced by Kent's choices in my own thinking. The order Tintinnida (originally described by Kofoid & Campbell, 1929, as "Suborder Tintinninea") employs as stem of its name the base of the generic name *Tintinnus*; therefore, I believe that this genus must be considered as type of its order. Order Entodiniomorpha (originally erected by Reichenow in Doflein & Reichenow, 1929, as "Suborder Entodiniomorpha") definitely was set up with the genus *Entodinium* in mind; therefore, I consider it as the ordinal type in spite of its primitiveness and its happening not to be type of a family of its own.

There are two cases in which I have not chosen names of types of included families in selection of ordinal types:

(1) In the one just mentioned above, involving the order Entodiniomorpha, the genus *Ophryoscolex*, type of the major family Ophryoscolecidae, ordinarily would be a much more reasonable choice, in my opinion. But I believe that the similarity between the names *Entodinium* and Entodiniomorpha and the wishes of the originator of the higher taxon should be honored: Reichenow (in Doflein & Reichenow, 1929) wrote: "Die wenigst spezialisierten Formen werden durch die Gattung *Entodinium* dargestellt, deren Namen wir daher zur Kennzeichnung der Unterordnung wählen..."

(2) In the case of the curious Odontostomatida (a replacement name for the preoccupied Ctenostomatida: see Corliss, 1957), I have decided to propose *Saprodinium*, ordinarily not the most likely candidate, as type because the name of the type (*Epalxis*) of the most important family, the Epalcidae, is probably destined to fall as a homonym of *Epalxis*, the name of a genus of fossil molluscs described earlier. *Saprodinium* is a member of the same family. *Discomorpha*, type of a second family and possibly the second most reasonable choice as type-genus of the order (for reasons too detailed to mention here), also has a name which should fall as a homonym: in this case a coleopteran

insect is implicated. As a general policy I think that it is unwise to become involved with genera whose names eventually will be contested on grounds of preoccupation, unless it seems absolutely necessary. I am aware, of course, that it is the organism, not the name, which is considered the type; but I should prefer to make exceptions in order to avoid the possibility of compounding rather than alleviating the confusion. Further discussion of this matter or citation of additional examples is beyond the scope of the present brief report.

The case of the familiar genus *Paramecium*, a member of the order Hymenostomatida, is a little complicated for two reasons: the controversy over the spelling of its name (see Woodruff's review, 1945), and the fact that it is still considered by many as the best-known genus of the order Trichostomatida, its taxonomic location of long-standing, in spite of its dubious affinities with genuine trichostomes (see Corliss, 1956, and comments on pp. 2 and 4, above). Also Copeland's (1956) choice of *Vorticella* as type of the subphylum (see pp. 2 and 6) possibly introduces a problem of ethics regarding my own presently proposed selection of *Paramecium* as type of the same major group of protozoa.

V. Relationship of representative drawings to proposed type-genera.

If it is desired to represent the type-genus of a higher category by a drawing, must the species depicted be the type-species of that genus? And must it be the type-specimen of that species, if either it or a previously published usable illustration of it is available?

Many complications arise here, at taxonomic, phylogenetic, and even nomenclatural levels. The foreword of the draft of the new Article 18 states, in part: "A type is an individual specimen or a taxon, not the name of the taxon. Of a species, it is a specimen, of a genus, it is a species, of a higher group, a genus, but *in the ultimate analysis each can be carried back to the individual specimen that is the type of a species*". [Italics mine.]

In the case of most protozoa, and particularly free-living ciliates, type-specimens just do not exist. Type-species of some genera may never have been figured; it will be recalled that drawings are not required by the rules. Many drawings of species apt to be involved in the matter under discussion are poor or only partial. What is the best procedure for the person interested in portraying "representative types" of ciliophoran orders and suborders? I endorse this fairly conservative point of view: to favor priority and to employ type-species of type-genera whenever possible, modifying original figures judiciously to show the features of greatest "typical" significance.

Summary

The purpose of this communication has not been to make formal proposal of type-genera for the higher ciliophoran taxa but to reveal some of the major problems involved in the background preparation for making such designations

at a more appropriate time and place. In general, the problems which I have encountered and which I have considered above tend to point up, in my opinion, certain definite inadequacies and an over-all incompleteness in the proposed new rules concerned with choice of types for higher categories.

The tentative conclusions or "answers" which I espouse as general procedures in regard to the five major problems considered in the body of this note are these:

1. That the type-genera of the highest categories should be chosen from among the types of their major included taxa.

2. That the types of classes or orders should also be types of their most appropriate included subclasses or suborders, with nominate subtaxa, when in existence, given first consideration.

3. That ordinarily the type of an order (or suborder) should also be the type of the most "typical" included family, with families whose names have been formed from the same stem as that of the higher taxa being given first consideration; and that the type should be an originally included genus of the higher taxon whenever possible.

4. That the I.C.Z.N., or its "Committee of Specialists", should not feel bound by selections of types in the past literature if there is good reason to judge such designations as inappropriate or as contravening (new) procedures which may be established with regard to such selections; and that, in the interests of stabilization and common sense, exceptions be allowed to the proposals suggested in points 1-3 above, when good reasons exist for such divergence from the rules.

5. That, if it is desired to represent type-genera by publication of drawings, such illustrations generally should be based upon existing figures of type-species unless the figures are inappropriate, entirely inadequate, or represent organisms whose nomenclatural status is controversial to a confusing extent.

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Addendum

The preceding comments relating to the subject of selection of type-genera for the suprafamilial zoological taxa were drafted several months before the appearance of the "Seventh Instalment of the London Congress Agenda Paper" (*Bull. zool. Nomencl.* 15 (Double-Part 16/17) : 489-556). Thus independently I have arrived at some of the same conclusions reached by Melville & Durham (Document 25/2) which are also clearly expressed in the brief discussion by Hemming (Document 25/1). My own earlier note (Document 25/3) also appears in the above cited issue of the *Bulletin of Zoological Nomenclature*. [I should like here to correct a serious typographical error in that paper ; the last two lines on p. 521 should read : "Kahl : same as for the order ; suborder Mobilina Kahl : *Urceolaria* Lamarek, 1801 ".]

The matter seems to me to be of such basic importance that a little repetition is not without value. Furthermore, I have raised other questions not previously voiced by anyone else. In my opinion the presently proposed new *Code* (as drafted by Bradley, 1957) is quite inadequate in regard to the general problem of "types", whether the animals under consideration belong to the Protozoa or the Metazoa. Such weaknesses are discovered only when serious attempts are made to apply the rules to actual cases.